Sixth Semester B.E. Degree Examination, June/July 2013
Satellite Communication

Time: 3 hrs.   Max. Marks:100

Note: *Answer FIVE full questions, selecting*
at least TWO questions from each part.

PART – A

1 a. What is satellite communication? List some of the services provided by satellite communication. **(06 Marks)**
   b. Explain frequency allocations for a satellite services. **(04 Marks)**
   c. State and explain the Kepler's law of planetary motion with neat diagrams and necessary equations. **(10 Marks)**

2 a. Define and explain the following terms applied to satellites in orbit:
   i)   Apogee and perigee points.
   ii) Ascending and descending nodes.
   iii) Prograde and retrograde orbits. **(10 Marks)**
   b. An earth orbsting satellite, has an eccentricity of 0.15 and semimajor axis of 9000 kms. Determine: i) Apogee height;   ii) Perigee height;   iii) Its periodic time.
   Given $\mu = 3.986 \times 10^5$ km^3/S^2 and assume a mean value of 6371 kms for earth's radius. **(06 Marks)**
   c. What are look angles? How they are determined? **(04 Marks)**

3 a. Explain atmospheric and ionospheric losses in satellite communication. **(06 Marks)**
   b. A receiver operating at 2800 MHz is shown in block diagram form in Fig.Q.3(b). Calculate its (G/T) ratio in dB/K referred to the output port of the antenna. **(08 Marks)**
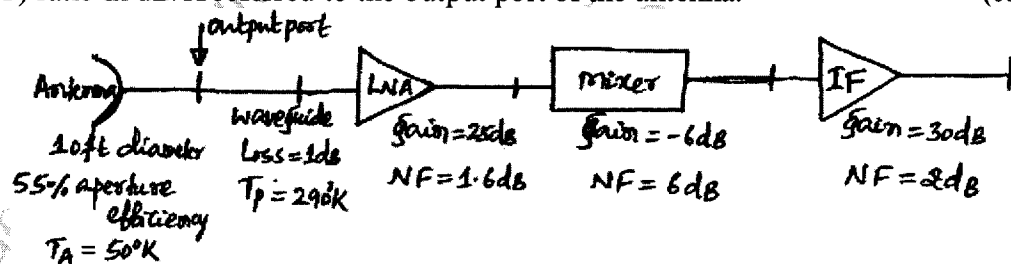

Fig.Q.3(b)

   c. Calculate rain attenuation for a frequency of 12GHz for circular polarization. The rain rate of 10mm/h is exceeded for 0.01 percent of the year. The earth station attitude is 600 meters, and an antenna elevation angle is 50°. The rain height is 3 kms. [ah = 0.0188, b$_h$ = 1.217, a$_v$ = 0.168, b$_v$ = 1.2]. **(06 Marks)**

4 a. Explain the functions of the following satellite subsystems:
   i)   Transponder.
   ii) Power system.
   iii) Wide band receiver.
   iv) Telemetry, tracking and command system. **(08 Marks)**
   b. What is meant by satellite altitude? With the help of neat diagram, explain two types of altitude control. **(12 Marks)**

PART – B

5 a. With the help of block diagram, explain the working of master antenna TV system. Compare CATV and MATV system. **(10 Marks)**

   b. With the aid of a block diagram, explain the indoor and outdoor units of a receive only home TV system. **(10 Marks)**

6 a. Explain the concepts of TDMA and FDMA using appropriate figures. Discuss the relative advantages and disadvantages of each. **(10 Marks)**

   b. The carrier-to-interference ratio at the ground receiving antenna is 23.3 dB. For the uplink [C/I] ratio is 27.53 dB. Find the overall ratio $[C/I]_{ant}$ for $(I/C)_U = 0.001766$ and $(I/C)_D = 0.004436$. **(06 Marks)**

   c. What are the different interferences that occur in FDMA system? **(04 Marks)**

7 a. Explain in brief different types of satellite mobile services. **(10 Marks)**

   b. Explain the following:
   i) Transponder capacity.
   ii) Frequency and polarization.
   iii) Bit-rate and digital TV. **(10 Marks)**

8 Write notes on:
   a. GPS and its uses.
   b. Iridium.
   c. Antenna look angles.
   d. VSAT and its applications. **(20 Marks)**

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